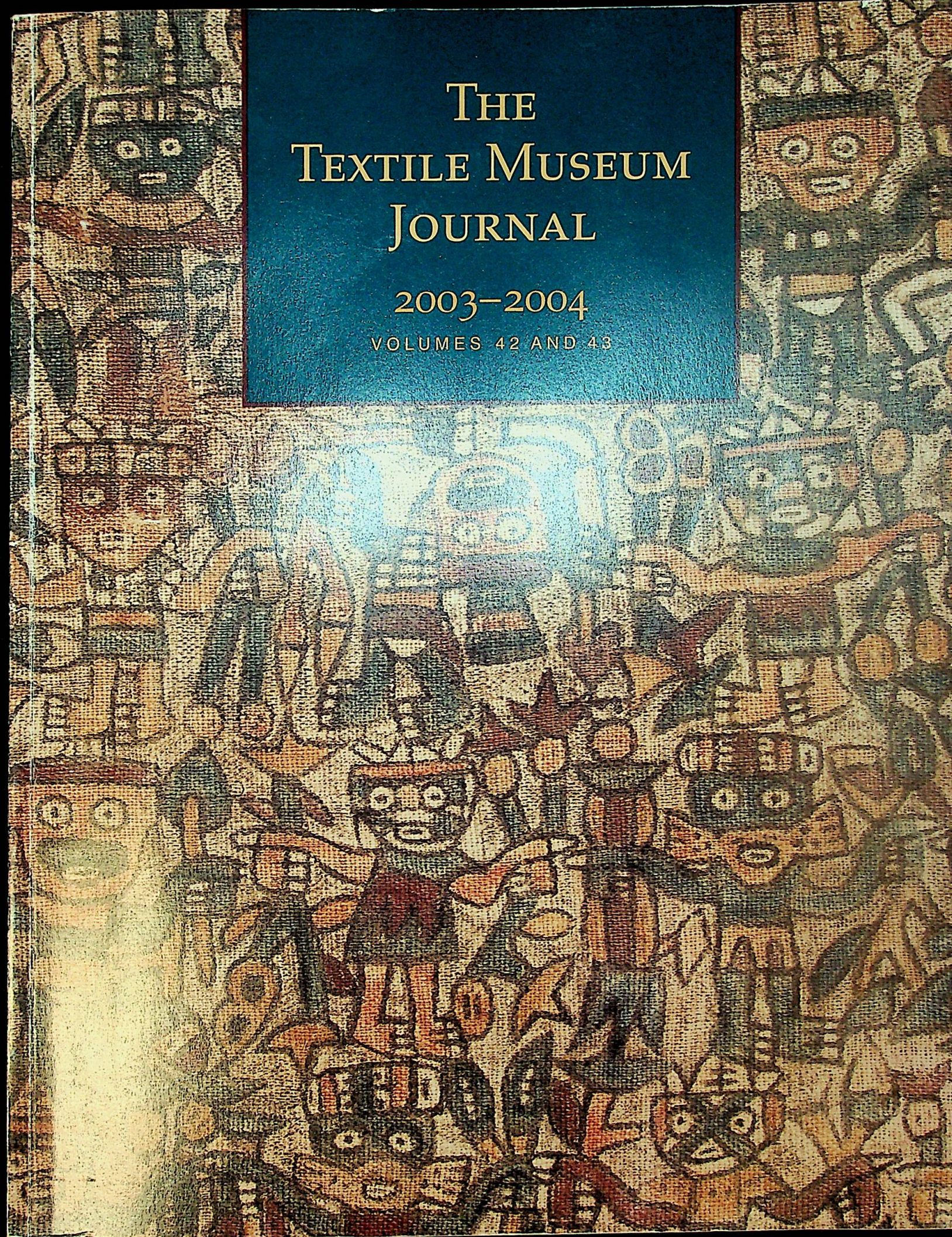


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Front and back covers: Skirt panel from a woman's dress (detail, warp direction horizontal), overall size: 82 x 158.5 cm. The Textile Museum 1964.31.2, museum purchase. See Mary Frame, *What the Women Were Wearing: A Deposit of Early Nasca Dresses and Shawls from Cahuachi, Peru*, pp. 13–53, fig. 24.

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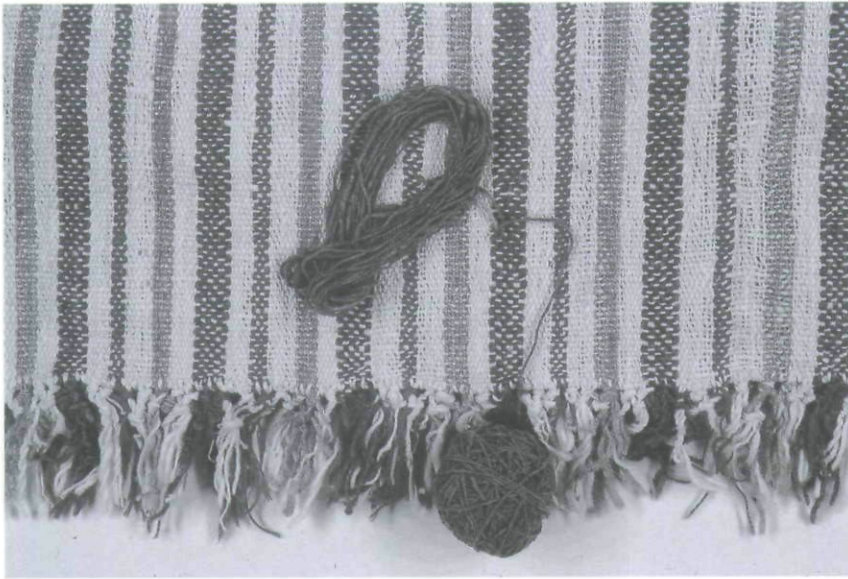


Fig. 1. Detail of a handspun cotton poncho with shellfish-dyed stripes with a hank and ball of shellfish-dyed yarns. The poncho also includes stripes in natural brown cotton and commercial red embroidery thread. The poncho is by Gavina Lainez Tomalá, Muey (officially named José Luis Tamayo), Santa Elena Peninsula, Guayas province, while the shellfish-dyed yarns were dyed by Irene Cruz Cruz, Pechiche. Slide by Karen E. Stothert, 1991.

Fig. 2. At low tide the Cruz family collected these and other fruits of the sea. The walnut-sized dye-producing mollusk (*Thais melones*) has yellowish coloration around its aperture and spots of purple. Punta Mambra, Santa Elena Peninsula, Guayas province. Slide by Karen E. Stothert, 1990.





# Shellfish Purple in Coastal Ecuador

Karen E. Stothert

In the ancient Mediterranean and in Central America, the rich purple dye extracted from certain mollusks was a mark of high status that also had symbolic significance in religious contexts. The production of purple-dyed yarn has persisted in Central America until recent times and has been recorded in Oaxaca, Mexico, and in Nicaragua.<sup>1</sup> The coast of Ecuador, however, was also a center for the production of this valuable purple yarn in the colonial and republican periods. The surviving shellfish-dyeing technology of coastal Ecuador (fig. 1) merits study because it is different from that of Central America and Mexico.

In earlier times the shellfish-dyeing technology of coastal Ecuador was part of a distinct and robust textile tradition, featuring the cultivation, spinning, and weaving of indigenous cotton.<sup>2</sup> This tradition is remarkable both because it contrasts with the ethnographic textile technology in the adjacent highlands and because it shows considerable continuity with the prehistoric past of the region. Unfortunately, however, it is now close to extinction.

Regrettably, the production of the purple-dyed, handspun cotton yarn has ceased in coastal Ecuador, but a few elderly women of the Santa Elena Peninsula remember the process and can reproduce it. The fact that weavers and their families in coastal Ecuador persisted in the production of purple-dyed yarn until the 1950s is a measure of the traditional value and importance of that product in this region.

## The Dye and the Mollusk

The dye (6,6'-dibromoindigotin) produced by various mollusks is chemically related to indigo, and like indigo it can be used to dye cotton. There are at least two techniques for extracting the dye from the shellfish. These were described for Central America by Jorge Juan

and Antonio de Ulloa (1748):

There are different ways for extracting the dye. Some people sacrifice the animal. Placing the shell on the back of the hand, they open the shell with a knife; next they squeeze the colorant from the head toward the rear end, which is subsequently removed, and the body is discarded. After having done this to a great quantity of shellfish, all the colorant is concentrated in a vessel; next the cotton threads are passed through the liquid.

...Other people extract the colorant by means of squeezing, but without killing the animal. They do not remove the animal entirely from the shell, but put pressure on it with the goal of causing it to spit out the dye. Afterwards, they replace the shellfish on the rock from which it has been removed; there the animal recovers, and in a little while produces another amount of colorant, although in a diminished quantity from the first time. If the operation is repeated three or four times, the quantity of dye extracted diminishes each time, and the animal dies of exhaustion.<sup>3</sup>

The mollusk used for shellfish dye in western Mexico and Central America is *Purpura pansa* or *Purpura patula*, which traditionally has been "milked" for its secretion and then returned to the rocks. This species, which may not be found on the coast of Ecuador, is twice the size of the species used for dyeing in Ecuador today.<sup>4</sup> In Ecuador, two other species have been used, *Thais melones* (synonym: *Purpura crassa*<sup>5</sup>), which is found on rocks along sandy beaches, and *Thais kiosquiformis* (also called *Purpura kiosquiformis*), which lives in a mangrove swamp habitat. *Thais melones* (fig. 2) is preferred by the people of the Santa Elena Peninsula today because it is locally more abundant and larger than *Thais kiosquiformis*.<sup>6</sup> In the area around the Gulf of Guayaquil and on Puná Island, however, informants state that in the recent past people used *Thais kiosquiformis*.



Both species were collected and the shells broken as they were processed for dye. They were not milked as are the dye mollusks in Mexico and Central America, nor are local people aware of milking as a possibility. Interestingly, when *Thais kiosquiformis* is used by the Boruca people of Central America, they also crush the shell to extract the dye.<sup>7</sup> These shells are only 30 to 40 millimeters (1 ¼–1 ½ inches) in length, and may not be suitable for milking and returning to the sea because they do not produce as much secretion as *Purpura pansa*.<sup>8</sup>

The range of *Thais kiosquiformis* extends south of the present Ecuadorian border into northern Peru,<sup>9</sup> but there is no account of its use in Peru for dyeing yarn. Further south, the waters of coastal Peru are cold, and these tropical species do not exist there. Here, another species, *Concholepas concholepas* (formerly *Concholepas peruviana*) has been credited as a dye source.<sup>10</sup> It is not clear whether this species can be milked or not, but individuals do reach 80 millimeters (3 ⅜ inches) in length.<sup>11</sup>

Some recent informants in Santa Elena have remarked that large species of *churo* (gastropod or conch, likely a *Murex*) could be used for dyeing, but these *churos* are now inaccessible. They speculate that some may produce red dye. Mary Elizabeth King noted that the Peruvian shellfish dye is sometimes a red-brown-purple color.<sup>12</sup>

### Purple Yarn in the Prehistoric Period in the Andes

No early colonial period documentation of shellfish dyeing is known for Ecuador, and the poor preservation of fabrics in archaeological contexts has prevented the recognition of shellfish purple on pre-Hispanic Ecuadorian textiles. In Peru, where textile preservation is much better, evidence for shellfish purple dye is rare. Purple is not a particularly common color in most Peruvian textile styles, and it is usually the result of over dyeing red and blue.<sup>13</sup>

One style where multiple fabrics have been reported to have been shellfish-dyed is that of Ocucaje, in the Ica valley, dating to Early Horizon 9 and 10, about the same time as Paracas (ca. 350–200 B.C.). King described these textiles, including dye identification provided by Max Saltzman.<sup>14</sup> King noted that “the most common application of shellfish dye...is in the form of painted ‘hand-and-dot’ designs,” and she identified a cotton gauze web that “appears to have been painted with dye” except for a strip along

one edge. A camelid hair gauze-weave textile is solidly dyed. The use of the dye for painted designs on cotton means that the Mexican technique of milking the dye onto the yarn could not have been used for these pieces. Probably the dye was aggregated in some manner, either by milking or other means.

The only later piece that has been analyzed and reported to have been dyed with shellfish is a striped bag from Pachacamac on the central coast of Peru, in which some of the warp yarns are purple.<sup>15</sup> Subsequent to this publication, Ann Rowe realized that the bag has grave associations and its context can therefore be specified.<sup>16</sup> The grave was found in the “oldest part of the grave-field 1,” according to the catalogue card, citing notes of the excavator, Max Uhle.<sup>17</sup> The grave included other bags and textiles with similar stripes as well as some worked *Spondylus* shell, and two ceramic bottles characterized by Dorothy Menzel as “Derived Nieveria style” and dated to Middle Horizon 2B (ca. 850–950).<sup>18</sup> The use of shellfish dye can thus be associated with the local style of Pachacamac during the height of the Huari empire. The spin of the purple yarns is the same as that of the other (predominantly cotton) yarns in the textiles, Z-spun and S-plied, suggesting local production. The chemists who analyzed the dye noted that it was concentrated “on the surfaces of the fibers, as compared to their cross sections,” so they assumed that the dye was “smeared onto the fibers” rather than that the fibers were immersed.<sup>19</sup>

The mollusks available on the Peruvian coast may have been more difficult to work with than the tropical ones used farther north; or the ready availability of camelid hair, which could be dyed with indigo and a red dye, may have lessened the need for a purple dye for cotton.

### Purple Yarn in the Historic Period in Ecuador

In the eighteenth century, the Santa Elena Peninsula, a Spanish-speaking area, was a center for the production of shellfish purple-dyed yarn, called *púrpura* or *caracolillo*. Shellfish-dyed yarn (*hilo de caracol*) was among the tribute paid by the indigenous people of the Santa Elena Peninsula, Chanduy, and Morro in the mid-eighteenth century.<sup>20</sup>

The description of the technique used to extract the dye provided by Juan and Ulloa, who traveled through Ecuador in 1730, is so similar to that provided by the same authors for Central



America (cited above), that one is suspicious that they may have saved time by using the Central American description for Santa Elena—although they certainly could have been eye-witnesses in both regions. They wrote:

... there is another species of shellfish in the jurisdiction of the Santa Elena Peninsula... that merits attention because it secretes a liquid which yields the purple dye so celebrated by the ancients. This color is extracted from the shells, living on the rocks struck by the waves, which give a milky liquid that yields the purple dye without more effort than just squeezing the animal to make it secrete, and by smearing what is to be dyed with that juice. Because the animal is enclosed in a shell (*caracol*), the dye is named *caracolillo*. The color is fine and permanent, and grows in brightness and strength as it is used and repeatedly washed. In the province of Nicoya, in the jurisdiction of Guatemala, this kind of sea shell is collected in the same manner, and the same color is extracted from it, and in many places, including Peru and New Spain [Mexico], the people value items made of purple-dyed cotton thread.<sup>21</sup>

In the nineteenth century, shellfish dyeing continued to be a regional cottage industry and one of several community economic specializations in Ecuador. At the end of the colonial epoch, William Bennett Stevenson made the following observations:

The small shellfish found on the rocks near to Santa Elena are worthy of notice... They are about the size of a hazelnut, shaped like a snail, and by different operations the beautiful purple dye is obtained from them. Some prick the fish with a needle or cactus thorn, and then press it down into the shell till a small quantity of milky juice appears, into which a portion of cotton is dipped; it is put into an earth jar or cup, and the fish is placed again on the rock: others take the fish out of the shell, and lay it on their hands; they press it with a knife from the head towards the tail or the slender part, which becomes filled with the liquid, and is cut off, and cotton is applied to absorb the moisture, otherwise yarn is passed through it. When the cotton is soaked in the liquor, and a sufficient quantity is obtained, it is mixed up with as

much dry cotton as it will conveniently make damp, the cotton being well carded or teased; it is afterwards dried and spun; when yarn is used it is only drawn through the liquor and dried. The color is at first a pale yellow, it subsequently changes to a greenish hue, and in the course of a few hours it acquires the beautiful purple tinge so much admired by the ancients, and which no future washing or exposure to the air can alter. The yarn dyed by the liquid procured from this small fish is often sold in Guayaquil, and is called *caracolillo*, from *caracol*, a snail.<sup>22</sup>

It is clear from other evidence that Stevenson was aware of Juan and Ulloa's book, and that he borrowed from it freely. Several aspects of his description of shellfish dyeing also appear to be copied from this source. For instance, laying the animal on the hand and pressing it with a knife, and passing the yarn through the liquid, are mentioned by Juan and Ulloa as Central American techniques. However, Stevenson's information on the use of a needle or cactus thorn is original. The fact that my informants remember women using cactus thorns to process the mollusks does lend credence to his account.

If we accept Juan and Ulloa's and Stevenson's accounts at face value, it appears that there was a change in the nineteenth century in Ecuador from milking the animals to breaking the shells. Such a change could have been made as an adjustment to smaller species or to the decline in the availability of larger individuals due to overfishing. Alternatively, the development of a regional export industry in the nineteenth century may have provoked the adoption of a "more efficient" technique of extracting the secretion from the shellfish, which has persisted to this day. Nevertheless, the possibility remains that both descriptions of the milking process for Ecuador are spurious and that the more destructive technique is the only one that has been used there.

A few years after Stevenson, the geographer Manuel Villavicencio described economic production in Santa Elena, listing yarn dyed with shellfish (*hilo de caracol teñido con la concha de púrpura*) among items sold.<sup>23</sup>

This industry was important enough in the region of Guayaquil to be mentioned by a malacologist working in northern Peru in the early twentieth century.<sup>24</sup> William Healey Dall mentions only a single, destructive technique.



He reports that *Thais kiosquiformis* was used

... in making a purple dye which is considered permanent. It is said that this forms a small industry in Ecuador. The purpuriferous gland is extracted and mixed with lime juice to prepare the dye. The flesh of the animal is also preserved for food...

It is said to be customary to take yarn from the region of Sechura and Piura to Guayaquil, to be dyed and returned, when it is used in fancy *alforjas* (saddlebags) and other hand-woven articles.<sup>25</sup>

In his study of the Cayapa (Chachis) people living in northern Ecuador, Samuel Barrett noted that they also used a shellfish purple dye, although he did not provide particulars about the species or the methods of collecting or preparing the liquid.<sup>26</sup>

The extinction of the shellfish-dyeing industry corresponds to a general decline in the demand for handwoven textiles due to the cheapness and availability of machine-made fabrics, the growth of wage labor, and the introduction of synthetic dyes. Degradation of the shellfish resources also may have played a role.

### Ethnographic Observation

In 1990 in Pechiche (map 3), Barrio 12 de Octubre, we visited señora Irene Cruz Cruz, who lives in a small house with several of her daughters, a

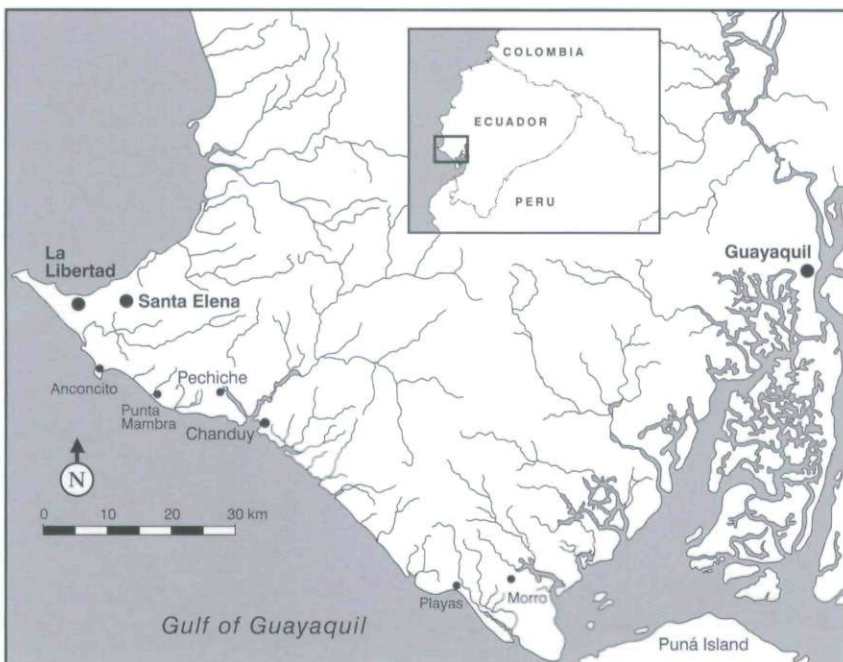
son and daughter-in-law, grandchildren, and great-grandchildren. Señora Irene, born in 1901(?) according to her son, learned to spin, weave, and dye from her mother and grandmother, but she no longer weaves. One of her daughters makes saddlebags, and her daughter-in-law learned this craft from señora Irene in her house. Señora Irene remembers with pleasure when the whole family was involved in dyeing yarn, so that the women could produce desirable belts, tablecloths, and saddlebags for clients. The value of these items was increased by woven designs of birds and other motifs, and warp stripes and colored fringes. Brown stripes were made with natural brown and red colored cotton, and purple stripes with shellfish-dyed yarn (fig. 1). This family never sold shellfish-dyed yarn for money, probably because the market declined early in this century, but they did compete successfully with other weavers by producing nicely decorated textiles for sale.

When she was a child and young woman, señora Irene's whole family would leave Pechiche before dawn and walk four hours or more to the beach, seeking one of several places where there were rocky headlands. Punta Mambra was a good spot because the men could fish in the estuary of the river for small fish and shrimp. They always went during the phase of the moon when there is an especially low tide, meaning more rocks were exposed. Shellfish were collected for dyeing and for eating. The shells were wrapped in cloth bundles and transported home on women's heads. Everyone enjoyed those days at the beach.

When this anthropologist offered the opportunity for the family to relive that history, five children and four adults piled into the pickup truck and accompanied us shell fishing. The strandloopers were armed with sacks (net or cloth) and were on the lookout for a variety of things. For instance, they sought salt, which forms naturally in the estuaries behind the barrier beach. In the old days, one of the men regularly came there on his bicycle for salt, which he sold from door to door in the villages. Another man found two large buoys that he took home to use or sell.

Another man looked for cowrie shells (*Cypraea cervinetta*). These shells are called *vaquitas* or *llaveros* (little cows or a polishing tool) because they could be employed as finishing tools for plaited hats (known outside of Ecuador as Panama hats), the manufacture of which was a principal cottage industry of Santa Elena until

Map 3. The Santa Elena Peninsula of Ecuador.





the middle of the twentieth century. One man collected the cowrie shells to make rattling toys for his grandchildren.

The men also collected urchins, *Fissurella* sp., which must be detached from the rocks with knives, and sea cucumbers. Also attached to the rocks were many snail-like mollusks, such as *Astraea buschii*, *Turbo* sp., and *Tegula panamensis*, which we collected to eat. The urchins could be grilled, but most of the mollusks were cooked in water to make a salad or to eat with rice.

Principally we searched for individuals of *Thais melones* that were greater than 2 centimeters ( $\frac{3}{4}$  inch) in length (fig. 2). These would have the larger mucous glands that produce the dye. Everyone complained that there were not many mollusks on the rocks the day we harvested them. There was agreement that thirty to fifty years ago there were many more shells and that it was easy to fill a sack with big individuals. In those days, the family came almost every month because they depended on the craft production of the women.

When the tide began to rise, we left the beach carrying our small sacks of mollusks. My informants remarked that in the old days they went with donkeys all the way to Aconcito to collect shellfish along the extensive rocky headland there. They slept in the houses of friends because the return trip could not be made in one day. Although people walked many hours home, the shellfish stayed fresh until the next day when the dyeing began.

The next morning, señora Irene gathered the *caracolitos* in a tin basin, and we sat on rice sacks on the ground. We launched into breaking the shells on a stone anvil with a piece of limestone that served as a hammer (fig. 3). This stone developed a concave, pecked pattern of wear often identified by archaeologists on "nutting" stones. One or more persons can crack, while others begin to extract the soft body of the mollusk from the shell fragments. The live animal wiggles in slow motion. The hard, inedible "tail" can be removed at this time and discarded with the shell fragments. The soft "heads" that contain the important mucous glands are deposited in a clean cup or basin (formerly a gourd dish).

Señora Irene began to process the "heads" by using her thumbnail to squeeze off each gland, concentrating the *hiel* (glands and their mushy contents) in a small basin while leaving the "heads" in another receptacle ready for making soup or salad. Her hands immediately became covered with sticky green secretion.

Some informants mention that the old ladies used to employ a thorn from a cactus (*Cardon*) to tease the gland away from the edible portion of the mollusk, as reported also by Stevenson.

As the containers were filled with their respective contents, señora Irene's son sliced limes and squeezed the juice into the two basins. Vinegar, he said, could be used, but they preferred lime juice, which they said produced a better color. Señora Irene explained that she washed the edible shellfish meat with the lime juice in order to collect any of the greenish *hiel*

Fig. 3. Señora Irene Cruz Cruz processing mollusks for dye. Each valve is broken between the stones shown in the foreground. The flesh is then separated from the shell for further processing. Pechiche, Santa Elena Peninsula, Guayas province. Slide by Karen E. Stothert, 1990.





that might adhere to the food. She mixed and squeezed the small bits of flesh with her hands, and then poured the liquid into the receptacle with the hiel, leaving the meat "dry."

She finished processing all the mollusk bodies and began to mix and knead the hiel with her hand to break down all the tissue into a smooth paste. Señora Irene commented positively that there was quite a bit, and she tasted the greenish mixture, remarking that it was strong. She said that during the night the lime juice would break down the material, producing a liquid by morning. She also added some water to the broken shells in another container and left them soaking.

All night the tightly covered hiel "rotted" (*puđriéndose*) in the lime juice. In the morning, señora Irene kneaded the hiel in the bowl to help break it down, and she passed the shells through a sieve and separated the water, which was a dull purple color. She was disappointed that this water was too light in color, so she added only a small quantity of it to the hiel, being careful not to dilute the liquid too much. In this way she collected any hiel that may have adhered to the shells and maximized the amount of dye produced from these shellfish. The mixture then sat for another day.

In the old days, indigenous cotton (*Gossypium barbadense*, also called creole cotton or *algodón criollo*) was cultivated abundantly in the family agricultural plots in the nearby river bottom. Spinners still prefer white indigenous cotton fiber to commercially grown cotton. People also

cultivated plants that produced naturally pigmented reddish, light brown, and dark brown cottons that served as contrasting colors in some decorated textiles (fig. 1). Most gardens have been abandoned because of deforestation (which caused erosion and lowered the water table), minor climate fluctuations, and economic disruption. Today, little cotton is produced, and the colored cotton is extinct locally.

We paid a local woman to spin a small quantity of white indigenous cotton yarn. Señora Irene tied this yarn into loose skeins in anticipation of the dyeing process. While sitting on the ground, she wound the yarn between a finger and one of her big toes. Her son was experienced in tying the ends for her. Señora Irene remarked that years ago the men of the family also knew how to do the whole process because in that way they earned the money to buy a pound of rice or some plantains when wage-earning opportunities were not available.

After the concoction had rested for two days, señora Irene strained the hiel. It had a beautiful purple color, and only a tiny amount of dregs remained in the fine plastic sieve. She dropped a little piece of string in the mixture to test it. Meanwhile, she and her son prepared the remaining skeins, which were wound loosely and tied at both ends with knots that could be easily removed. When these were ready, she extracted the test string and proclaimed the dye to be good. Several skeins were introduced into the dye bath and stirred with a stick to moisten them completely and evenly (fig. 4).<sup>27</sup> She added several more skeins, but stopped when she perceived that another would dry up the liquid in the basin. Señora Irene predicted that the handspun cotton yarn would take the color better than any commercial string (which is sometimes used for weaving).

The skeins remained "sleeping" in the dye bath all night, and in the morning señora Irene showed us how the liquid was almost all consumed by the yarn. Without squeezing the skeins, she hung the yarn to dry in the shade by inserting a wooden pole through each hank. She remarked that in the old days the dye was much stronger. In a short time the yarn was dry, and the purple color was bright and rich. Later we took down the pole, and señora Irene and her son untied the knots of each skein. While he walked a few steps back to open the skein, she took one end and began winding the yarn into a ball. The yarn was then ready to use in warp preparation or in dressing the loom.<sup>28</sup>

Fig. 4. Stirring hanks of hand-spun cotton thread into the shellfish dye bath, where they will soak all night, absorbing all the liquid. Pechiche, Santa Elena Peninsula, Guayas province. Slide by Karen E. Stothert, 1990.





The purple color that I observed was very vibrant when it was beheld wound into a ball, but the stripes on the textiles made with this *hilo morado* are better described as lavender or lilac in hue, and the color does fade slightly in textiles exposed to sunlight (fig. 1). The technique used in Santa Elena by the living informants may not be prehistoric, but it represents an alternative to the previously recorded milking technique and one that also may have been widespread in ancient America.

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## Notes

1. Gerhard 1962; Turok ed. 1988.
2. Alvarez 1987; Barrett 1925; Hagino and Stothert 1984; Klumpp 1983; Stothert 1997; Stothert and Freire 1997; Stothert and Parker 1984.
3. Turok ed. 1988, pp. 28–29; trans. Stothert.
4. Keen 1971, p. 553.
5. Keen 1971, p. 550.
6. Among the shells that we collected for shellfish dyeing were a few individuals more similar to *Purpura pansa* than to *Thais melones*, but all the individuals were small.
7. Stone 1949, pp. 13, 16–17, cited in Gerhard 1962, p. 183.
8. See also Turok ed. 1988, pp. 25, 28–29.
9. Dall 1910, p. 170.
10. Michel et al. 1992.
11. Dall 1910, p. 169.
12. King 1965, p. 96.
13. Fester 1954; Michel et al. 1992. Information on Peruvian textiles in this section has been supplied by Ann Pollard Rowe.
14. King 1965, pp. 94–96, fig. 11; Saltzman 1978, pp. 179–181. King (1965, p. 96) states specifically that no Paracas Cavernas fabrics have been identified as shellfish-dyed. Presumably, the fabric identified as such by Junius Bird and analyzed by Saltzman (Saltzman et al. 1963, fig. 6; Saltzman 1978, p. 181) is an undocumented specimen that was given this attribution by Bird. King was undoubtedly aware of this piece. Since Paracas Cavernas textiles are stylistically very closely related to those from Ocucaje, such an attribution would have been plausible before the study of the Ocucaje textiles. The textile, however, is more likely to be from the Ica valley.
15. Michel et al. 1992, fig. 9.
16. Rowe personal communication, 1999.
17. The dates given by Michel et al. (1992, p. 74) are a misrepresentation of Ann Rowe's communication with the authors. Uhle's gravefield 1 contains material datable from Middle Horizon 2 (ca. A.D. 800) through the Inca occupation period.
18. One of the bottles (Uhle number 998, UM 26769) is illustrated in Gayton 1927, pl. 97c, and the other (Uhle number 997, UM 26767) is similar to another bottle illustrated in the same plate (97e). These bottles are referenced in Menzel 1964, p. 57, note 345.
19. Michel et al. 1992, pp. 79–80.
20. Coleti [1771] 1975, pp. 346–47; Juan and Ulloa 1748, vol. I, lib. IV, cap. VIII, para. 431, pp. 244–45; Juan and Ulloa 1982, p. 585; Laviana Cuetos [1774] 1984, p. 74; Zelaya [1765] 1974, p. 101.
21. Juan and Ulloa 1748, vol. 1, lib. IV, cap. VIII, para. 431, pp. 244–45; Juan and Ulloa 1982, p. 585; trans. Stothert.



22. Stevenson 1825, pp. 234–35.
23. Villavicencio (1858) 1984, p. 257.
24. Dall 1910; see also Gerhard 1962, p. 182.
25. Dall 1910, pp. 170–71.
26. Barrett 1925, p. 258.
27. One informant, an old lady whose mother had dyed with shellfish, said that the yarn used to be boiled in salted water for a half hour before it was dyed. Señora Irene, however, had never heard of this custom. The informant may have been confused by the fact that synthetic dyes are prepared by boiling the yarn in the dye (Klumpp 1983, p. 83).
28. See Hagino and Stothert 1984; Stothert and Parker 1984; Klumpp 1983.

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